LM321LVIDBVR-TP

General Purpose, 1MHz, Micro-Power CMOS Op-Amps

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Features

- General Purpose, Low Cost
- Gain Bandwidth Product: 1MHz
- Low Quiescent Current: 40μA/Amplifier
- Offset Voltage: 5.0mV Maximum
- Offset Voltage Temperature Drift: 2uV/°C
- Input Bias Current: 10pA
- Unity Gain Stable
- Rail-to-Rail Input and Output
- No Phase Reversal for Overdriven Inputs
- Supply Voltage Range: 2.2V to 5.5V
- Operating Temperature: -40°C ~ +125°C
- Type Package:SOT23-5

Applications

- Audio Output
- Battery and Power Supply Control
- Smoke/Gas/Environment Sensors
- Medical Equipment
- Portable Instruments and Mobile Device
- Active Filters
- Piezo Electrical Transducer Amplifier
- Sensor Interface
- ASIC Input or Output Amplifier

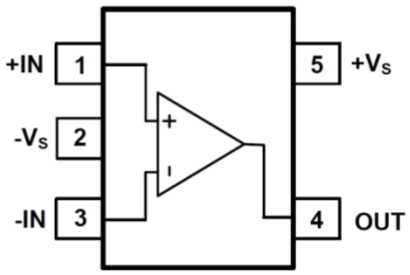
General Description

LM321 are general purpose single, CMOS op-amps with low offset, high frequency response, low power, low supply voltage, and rail-to-rail inputs and outputs. with low cost among all micro-power CMOS amplifiers.

The LM321 are unity gain stable with a constant 1MH zgain-bandwidth product, 1V/μs slew rate while consuming only 45μA of supply current per amplifier. The rail-to-rail input and output characteristics allow the full power-supply voltage to be used for signal range.

The LM321 are ideal choices for battery-powered applications because they minimize errors due to power supply voltage variations over the lifetime of the battery and maintain high CMRR even for a rail-to-rail input op-amp.

Pinout (top view)



Pin Configurations

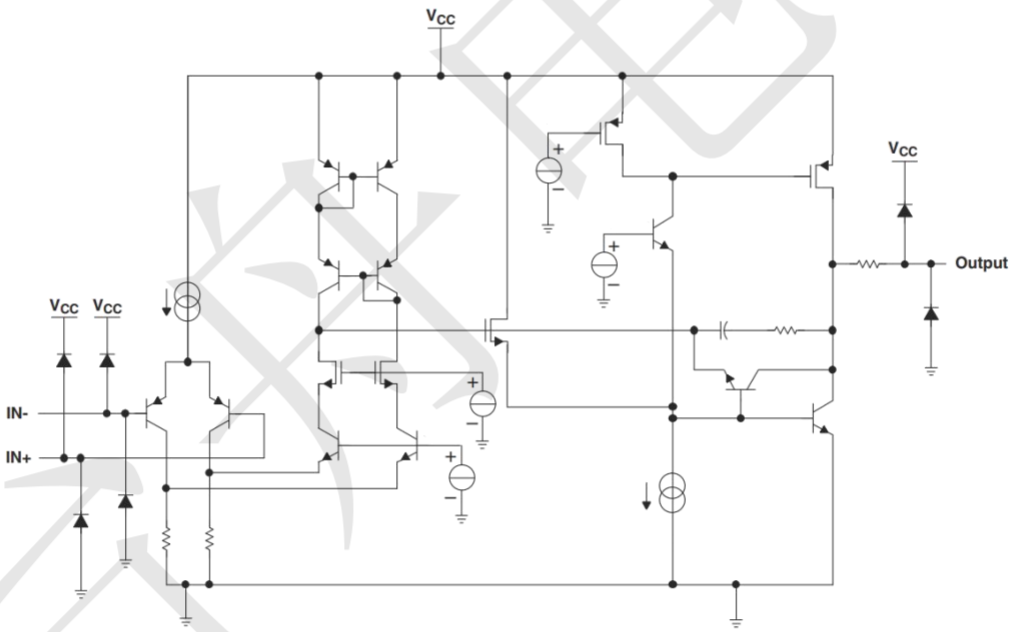
Pin Number	Pin Name	Pin Function
1	+IN	In-phase input
2	-Vs	Chip Supply Voltage(Negative)/GND
3	-IN	Reverse input
4	OUT	Output
5	+Vs	Chip Supply Voltage(Positive)/VDD

Absolute Maximum Ratings

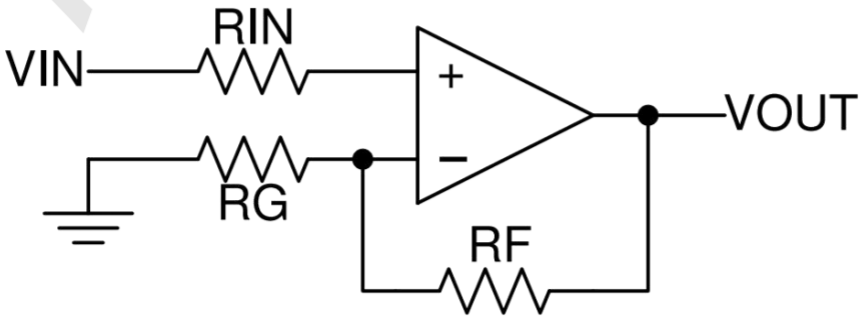
(@TA = +25°C, unless otherwise specified.)

Condition		Rating		UNIT
VDD to GND	Power Supply Voltage	-0.5~+7V		V
IN+ or IN-	Analog Input Voltage	GND-0.5V~VDD+0.5V		V
PDB	PDB Input Voltage	GND-0.5V~7V		V
θJA	Thermal Resistance Junction-to Ambient	190		°C/W
LT	Lead Temperature (Soldering, 10 sec.)	260		°C
Temperature	Junction Temperature , TJ	-40	125	
	Storage, Tstg	-55	150	

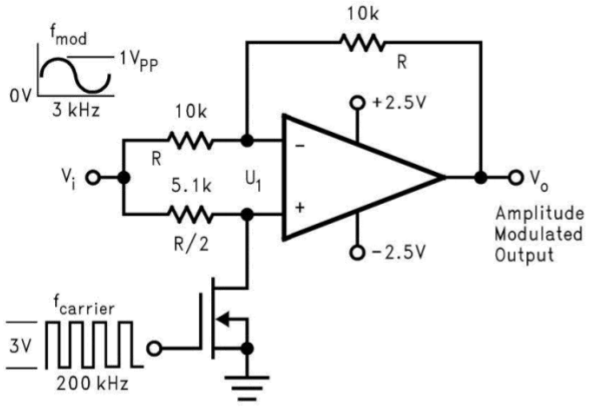
BLOCK DIAGRAM



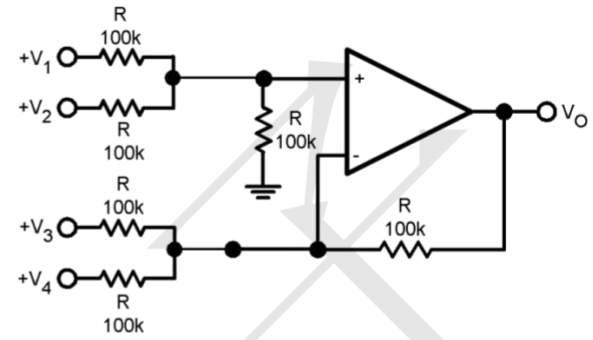
Power Supply Bypassing



Typical Application Circuit



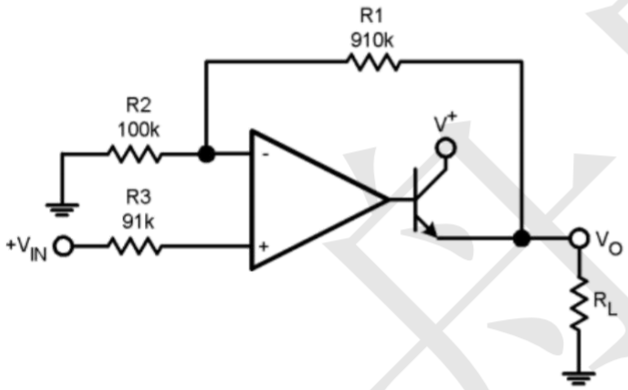
Amplitude modulator circuit



Note: $V_O=V_1+V_2-V_3-V_4, (V_1+V_2) \geq (V_3+V_4)$ for $V_O \geq 0V_{DC}$

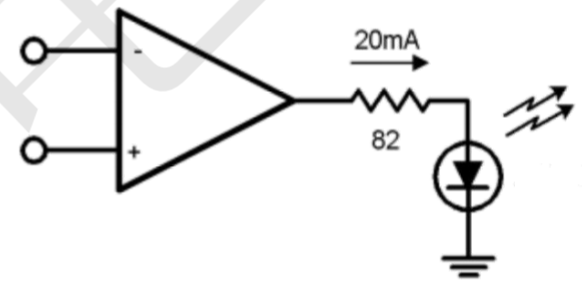
DC adder amplifier

(V_{IN}'s$\geq 0V_{DC}$, $V_O \geq V_{DC}$)

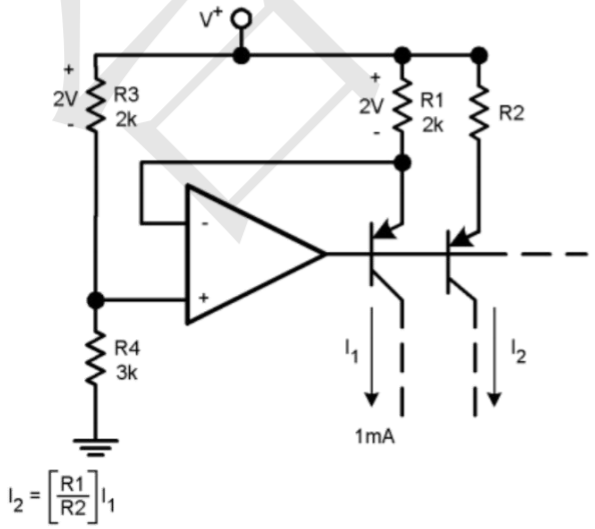


$V_O=0V_{DC}$ for $V_{IN}=0V_{DC}$, $A_V=10$

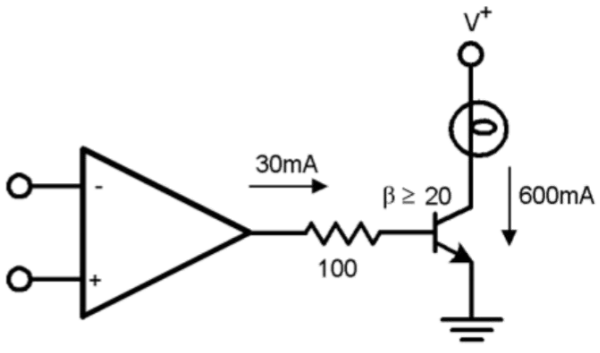
Power Amplifier



LED Driver



Fixed current source



Lamp Driver

Electrical Characteristics

(At VS = +5V, VCM = 0V, CL = 15pF, and TA = +25℃, unless otherwise noted.)

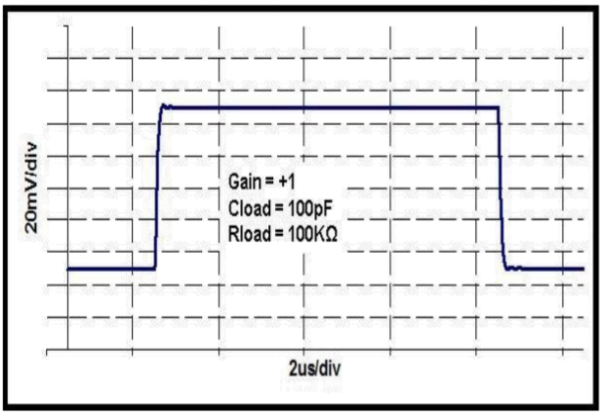
PARAMETER	SYMBOL	TEST Conditions	MIN	TYP	MAX	UNIT
Supply-Voltage Range	V_{DD}	Guaranteed by the PSRR test	2.2	--	5.5	V
Quiescent Supply Current (per Amplifier)	I_Q	V_{DD} = 5V	30	40	60	uA
Input Offset Voltage	V_{OS}		--	±0.5	±5	mV
Input Offset Voltage Tempco	$\Delta V_{OS}/\Delta T$		--	2	--	μV/°C
Input Bias Current	I_B	(Note 2)	--	10	--	PA
Input Offset Current	I_{OS}	(Note 2)	--	10	--	PA
Common-Mode Voltage Range	V_{CM}		-0.1	--	VDD +0.1	V
Common-Mode Rejection Ratio	CMRR	VDD=5.5 Vss-0.1V VCM VDD+0.1V	55	65	--	dB
		Vss≤V_{CM}≤5V	60	80	--	dB
Power-Supply Rejection Ratio	PSRR	VDD = +2.5V to +5.5V	75	94	--	dB
Open-Loop Voltage Gain (0.05V≤VO≤4.95V)	A_V	VDD=5V, RL=100kΩ	100	110	--	dB
		VDD=5V, RL=5kΩ	70	80	--	dB
Output Voltage Swing	V_{OUT}	|V_{IN+}-V_{IN-}|γ10mV V_{DD}-V_{OH}	--	6	--	mV
		RL = 100kΩ to VDD/2 VOL-VSS	--	6	--	mV
		|V_{IN+}-V_{IN-}|γ10mV V_{DD}-V_{OH}	--	60	--	mV
		RL = 5kΩ to VDD/2 VOL-VSS	--	60	--	mV
Output Short-Circuit Current	I_{SC}	Sinking or Sourcing	--	±20	--	mA
Gain Bandwidth Product	GBW	A_V = +1V/V	--	1	--	MHz
Slew Rate	SR	A_V = +1V/V	--	0.6	--	V/μs
Settling Time	t_S	To 0.1%, V_{OUT} = 2V step A_V = +1V/V	--	5	--	μs
Over Load Recovery Time		V_{IN} X Gain=V_S	--	2	--	μs
Input Voltage Noise Density	e_n	f = 10kHz	--	20	--	nV/√Hz

Notes: **1:** All devices are 100% production tested at T_A = +25°C; all specifications over the automotive temperature range is guaranteed by design, not production tested.

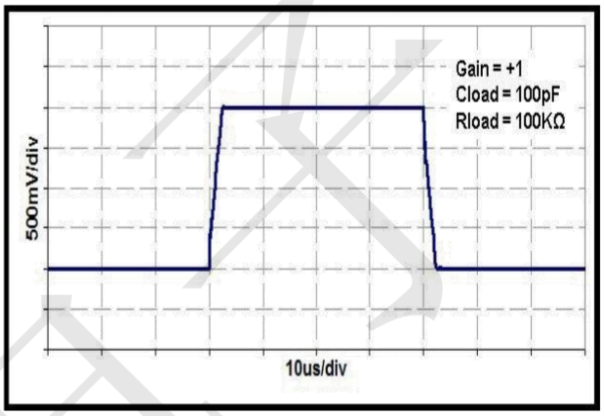
2: Parameter is guaranteed by design.

Typical Performance Characteristics (@TA = +25°C, unless otherwise specified.)

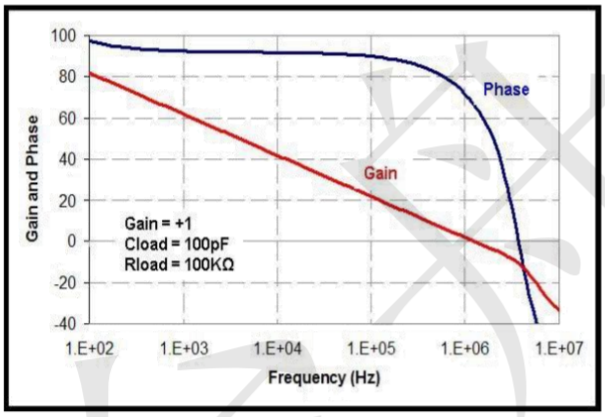
Small-Signal Step Response, 100mV Step



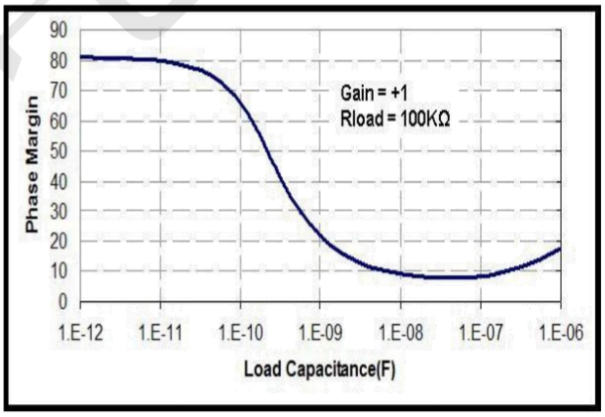
Large-Signal Step Response, 2V Step



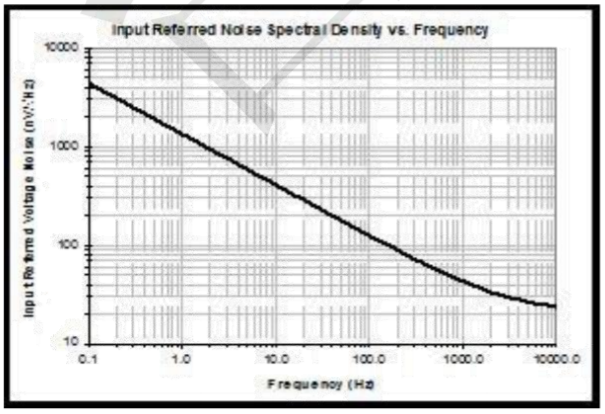
Open-Loop Gain and Phase



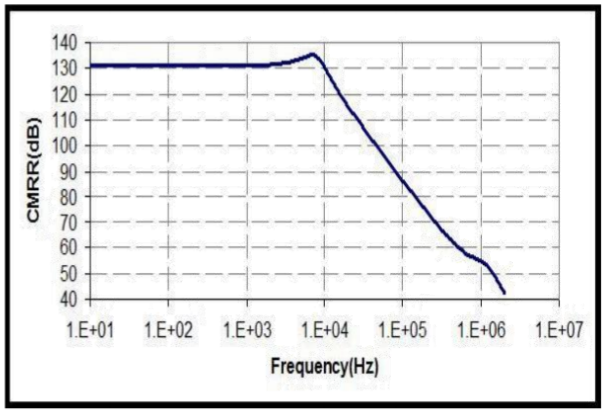
Phase Margin vs. C_{LOAD} (Stable for Any C_{LOAD})



Input Voltage Noise Spectral Density

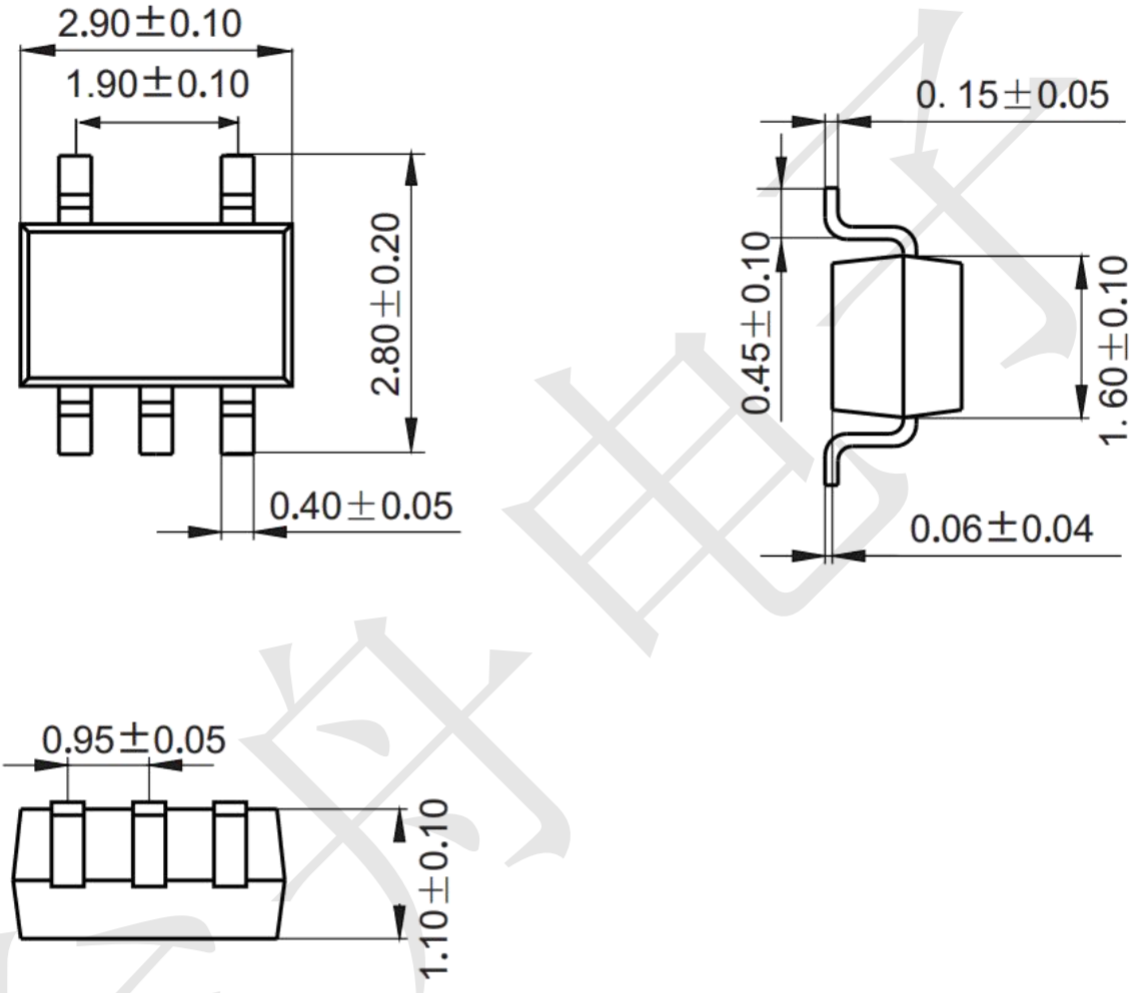


Common-Mode Rejection Ratio



Package information (Unit: mm)

SOT23-5



Mounting Pad Layout (Unit: mm)